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Actuarially Speaking: A Plain Language Summary of Actuarial Methods and Practices for Public Employee Pension and Other Post-Employment Benefits

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By Grant Boyken
Senior Research Specialist

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I F O R N I A R E S E A R C H B U R E A U

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INTERNET ACCESS

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I. INTRODUCTION

Why a primer on actuarial methods and policies?

The cost and sustainability of pension and retiree health benefits for public employees have been called into question in recent years. Pension benefit increases that were granted in the midst of the bull market in the late 1990s, combined with the downturn of the financial markets in the early 2000s, have increased the amount that employers need to contribute to pension plans to pay the cost of benefits. In addition, demographic changes, such as the aging of the public sector workforce and longer life expectancies, are predicted to increase the cost of providing retiree pension and health benefits.

In response to these issues, a proposed ballot initiative in 2005 sought to prohibit new public employees in California from participating in defined benefit pension plans, which supporters of the initiative viewed as more costly than defined contribution plans.* Although the initiative never made it to the ballot, the concerns out of which it emerged have not subsided.

In December 2006, Governor Arnold Schwarzenegger established the Public Employee Post-Employment Benefits Commission to address unfunded post-employment benefits. In addition to the cost of providing public pensions, the Commission's hearings in 2007 illustrated a heightened concern about the costs of providing retiree health benefits. This is due to rising medical costs as well as new governmental accounting standards that require public employers to report the cost of these benefits as they accrue rather than at the time that they are paid.

Because a thorough understanding of these issues requires at least a basic understanding of actuarial accounting practices used for pension benefits, and increasingly for "other post-employment benefits" (OPEB; which includes retiree health, dental, vision and other non-pension benefits), this report was developed to serve as a reference guide for policy makers, government employers, pension and health plan administrators, and members of the general public.

* Public employers in California typically provide primary pension benefits through a defined benefit plan. In contrast to defined contribution plans, in which retirement income depends on the amount accumulated in an employee's individual account, defined benefit plans guarantee a specific level of retirement income that is calculated based on an employee's age, years of service, and salary.

How are defined benefit pension plans funded?

A key objective for defined benefit pensions is to strive for *prefunded* benefits, which means that contributions are made during the working career of the employee with the objective that at the time the employee retires, those contributions (and the interest earned on them) will be sufficient to pay for the entire cost of the employee's pension benefits.

Retirement system funds are typically held in some form of trust that can only be used to pay member benefits and the costs of administering the pension plan. Defined benefit retirement systems receive income from returns on invested assets and contributions from employers and employees. The majority of retirement systems' income generally comes from investment returns.

Unlike private sector defined benefit plans that tend to be "non-contributory" (i.e., do not require employees to contribute), public employees generally contribute to defined benefit plans at a fixed rate (typically a percentage of salary) that varies among different types of employees and retirement systems. In some cases, collective bargaining agreements may specify that employers pay employees' contributions for a period of time.

Employer contributions vary from year to year depending on investment returns and actuarial calculations that determine the size of the pension fund that will be needed to pay current and future benefits.

How are retiree health and other post-employment benefits funded?

Historically, the majority of public sector employers that have provided retiree health and other post employment benefits have done so on a pay-as-you-go basis; paying for benefits as the costs come due with little or no money set aside to pay benefits in future years.

Recently there has been growing interest in prefunding OPEB due, at least in part, to rising medical costs that have made it increasingly more costly to provide retiree health benefits on a pay-as-you-go basis. Between 2000 and 2007, for example, annual premium increases for California Public Employees' Retirement System (CalPERS) health plans have averaged more than 12 percent.[1] The monthly premium for CalPERS Health Maintenance Organization (HMO) plans in 2007 was more than $800 to cover an employee and one additional family member.

In addition to rising medical costs, new accounting standards issued by the Governmental Accounting Standards Board (GASB) have focused greater attention on government employers' OPEB liability. The purpose of the standards is to make accounting methods more accurately reflect the cost of providing public services by recognizing the costs of the benefits at the time that they are earned, rather than when they are paid. As a result of the new standards, public agencies are beginning to report large unfunded OPEB liabilities on their balance sheets that they were not previously required to report.

The provisions of the new GASB standards do not require governments to prefund OPEB plans, but they provide a framework – and the impetus – for doing so. Prefunding would mean establishing some form of trust similar to those that currently exist for pensions. Annual costs paid into an OPEB trust would be based on actuarially determined amounts that, if paid on an ongoing basis, generally would provide sufficient resources to pay benefits as they come due.

Although the State of California has not yet developed a formal plan to prefund retiree health benefits for state employees, a number of local governments have begun to do so. Several have begun to contribute to the California Employers' Retiree Benefit Trust Fund that CalPERS launched in March 2007.* Initially, the fund was open only to employers that contract with CalPERS to provide health benefits under the provisions of the Public Employee Medical and Hospital Care Act (PEMHCA). New legislation (Hernandez, AB 554, Chapter 318, Statutes of 2007) expands the program to allow employers that do not participate in the CalPERS health program to use the trust to prefund OPEB. A number of public employers have also established, or are examining the possibility of establishing, OPEB trust funds of their own.

What is an actuary?

An actuary analyzes the financial consequences of risk. Actuaries use mathematics, statistics, and financial theory to study uncertain future events, particularly those of concern to insurance and pension programs. Pension actuaries analyze probabilities related

* Legislation passed in 1988 did establish a fund that allowed public employers to prefund retiree health benefits through the Public Employee Medical and Hospital Care Act (PEMHCA) (AB 1104, Elder, Chapter 331, Statutes of 1988). However, the fund remained dormant until recently when CalPERS formally launched the Retiree Benefit Trust Fund.

to the demographics of the members in a pension plan (e.g., the likelihood of retirement, disability, and death) and economic factors that may affect the value of benefits or the value of assets held in a pension plan's trust (e.g., investment return rate, inflation rate, rate of salary increases). They determine the value of pension benefits and work with employers to devise strategies for funding the cost of those benefits.

What is an actuarial valuation?

An actuarial valuation can be thought of as a financial check-up for a pension or retiree health benefit plan. It measures current costs and contribution requirements to determine how much employers and employees should contribute to maintain appropriate benefit funding progress. It also measures plan assets and liabilities to determine funding progress. This includes comparing recent plan experience with assumptions made in the previous valuation.

Actuarial reports vary in format, but most follow a similar structure. The information is often shown in three parts of the report. The summary usually includes text descriptions and numerical tables of the important results. The body of the report usually contains more details on the results and how they were determined. Exhibits or appendices are often used for summaries of benefits and assumptions, required disclosure information, member demographic information, and more detailed contribution information. The valuation report presents both what goes into the valuation and the results that come out of it.

Under current law in California (Government Code Sections 7501 through 7504) each public retirement system is required to have an actuarial valuation performed at least once every three years. Both the California Public Employees' Retirement System and the California State Teachers' Retirement System (CalSTRS) employ full-time actuaries to perform statutorily required valuations. CalPERS and CalSTRS also contract with outside actuarial consulting firms to perform independent valuations annually.

In 1992, retirement system boards were given Constitutional authority by Proposition 162 to set actuarial methods and assumptions as part of the "administration of the system." Retirement systems usually review actuarial methods and assumptions on a regular basis (typically every two to three years). Assumptions are almost always based on a system's experience and boards typically accept the actuary's recommended assumptions.

A valuation takes into consideration a range of factors that affect the funding progress of the plan including:

- Plan provisions;
- Participant data;
- Financial data;
- Actuarial assumptions; and
- Funding methods and policies.

What is the purpose of an actuarial valuation?

Contribution requirements

The primary purpose of a valuation is to determine how much employers and employees should contribute to the plan during the upcoming year. Typically, public employees contribute a fixed percentage of their salaries to a defined benefit plan. Annual changes in contribution rates generally affect only the employer contribution.

The valuation determines the annual amount of employer contributions that will be necessary to pay for the costs of current benefits (the normal cost) as well as the annual costs of any unfunded liability (benefits that have already accrued, but for which the plan does not have sufficient assets to pay). This amount that the employer is required to contribute is referred to as the Annual Required Contribution, or ARC.

Usually there is a lag between the valuation date and the date new contribution rates begin. For example, the June 30, 2007 actuarial valuation might set contribution rates for the 2008/09 fiscal year, starting July 1, 2008.

Funding progress

The second key purpose of a valuation is to determine the plan's funding progress by examining how the plan's assets compare with its liabilities. The funding progress can be described as a *funded ratio* (assets divided by liabilities) or as the *funded status*, which is the amount of over-funding or under-funding (assets minus liabilities).

If assets are greater than liabilities:

- The *funded ratio* is over 100 percent; and
- The *funded status* is the amount of over-funding, and is called the *surplus*.

If assets are less than liabilities:

- The *funded ratio* is under 100 percent; and
- The *funded status* is the amount of under-funding, and is called the *unfunded liability* or, more formally, the *unfunded actuarial accrued liability* (UAAL).

Actuarial Certification

A third key purpose is to get the actuary's professional opinion on the actuarial methods and assumptions and funding policy. In California, retirement system boards have the responsibility to set actuarial methods and assumptions and determine contribution policy, while the actuary's job is to make recommendations to the board in these areas. The retirement system board is not required to take the actuary's recommendation, but the actuary must certify that what the board has decided to do falls within a range of acceptable actuarial standards of practice.

Disclosure requirements

Accounting and other financial reporting rules require disclosure of the plan's *annual required contribution*, plan assets and liabilities, as well as other information. Disclosure is required for both employer and plan financial statements.

Basis for pricing plan changes

The actuarial valuation provides the baseline for evaluating the impact of any possible benefit changes on plan costs and plan liabilities.

II. Actuarial Methods and Funding Policies

C + I = B + E: Over time, contributions plus investment returns must equal benefits plus expenses.

This equation provides the foundation for understanding how pension (or prefunded OPEB) plans are funded. Employer and employee contributions flow into a trust fund that is dedicated for the purpose of paying benefits. Those contributions earn investment returns. Benefits and expenses (associated with administering the benefits and investing the assets) are paid out of the fund. Any increase in benefits or expenses will *ultimately* require a corresponding increase in contributions or investment returns.

The actuarial assumptions and funding policies adopted by the plan determine how and when the costs are paid. Changes in those assumptions or policies can increase or decrease the current contribution requirements. However, it is important to remember that the ultimate cost of the plan will depend on the plan's *actual* experience, regardless of what is *assumed* to happen.

Actuarial valuations try to achieve equity across generations of taxpayers by funding the employees' benefits while they are rendering service so that the cost of the benefits is incurred by the taxpayers receiving services from those employees. The goal is that at retirement there will be enough money, on a present value basis, to pay for the entire benefit. Another advantage of prefunding is that over time the majority of benefit cost is paid by investment returns rather than by contributions from the employer or employees.

The actuary's role is to help the retirement boards balance the equation by developing a long-term contribution plan necessary to pay expenses and benefits. As noted above, actuarial assumptions, methods and funding policies may affect the timing of when and how the long-term benefit cost is paid. The goal of choosing accurate actuarial assumptions and level funding methods and policies is to have stable, level contributions over time.

Despite the apparent simplicity of the equation (C + I = B + E), pension actuaries' task of balancing it can be complex. Describing what he refers to as the "tenuous nature of actuarial science," CalPERS' Chief Actuary, Ron Seeling, explains that the role of the pension actuary is to make long-term assumptions about an unknown future:

You hire some new employee at age twenty-something, and you've got to worry about when is this person going to leave? What will I owe them? How much service will they have? What will their salary be?... [You] make assumptions about all of that. And you do these studies, and you make your best assumption about the future. And the fact that it doesn't work out on a year-by-year basis is no great surprise. And the question is, how is the actuary going to respond to that and change employers' contributions?[2]

Indeed, how the actuary and the retirement board respond can have a significant impact on funding progress and future contributions. Beyond the uncertainty associated with predicting the future, additional complexity stems from the fact that retirement systems may pursue varying funding objectives. While some may strive to keep contributions as low as possible or as steady as possible, others might place a greater emphasis on working toward full funding as quickly as possible. These objectives impact actuaries' recommendations to retirement system boards, as well as the assumptions and funding policies adopted by those boards.

The Actuarial Funding Method

The actuarial report will include a summary of actuarial methods and funding policies that have been adopted by the system. These techniques have been developed by actuaries to:

- Determine how much of the total value of the members' future benefits should be contributed each year by both the employer and the members; and
- Determine the employer contribution in a way that reduces short-term, year-to-year volatility, but still assures that future contributions, together with plan assets, will be enough to provide those future benefits.

Actuarial methods and funding policies involve terminology and concepts that are unique to pension (and OPEB) plan funding. What follows is a brief description of the main elements of actuarial methods and policies.

Total Present Value of Future Benefits

The total present value of future benefits (PVB) is the total cost of benefits accrued throughout an employee's career. The PVB can

be divided into two parts: costs that are allocated to past years and the present value of costs of benefits allocated to future years.

If the system has assets equal to this PVB (and all assumptions come true) then no future contributions would be needed to provide future benefits for current active and retired members – even including future service and salary increases for active members. The actuarial methods and funding policies determine how much of the PVB should be contributed in the current year (and future years) so that, together with the assets, the entire PVB will be funded.

The Normal Cost

The *normal cost* is the portion of the total present value of benefits that actuaries allocate to each year of service, both past and future. It can be thought of as the annual premium that the employer must contribute to fund the benefit. If the normal cost is paid for each year of service and all actuarial assumptions are met, the employee's pension benefit will be fully funded at the time of retirement.

Conceptually, this would be (somewhat) simple to understand if the normal cost for a given year represented the (present value of the) cost of the benefits accrued during that year. But alas, conceptual simplicity is neither the goal, nor the forte, of the pension actuary.

A key objective that pension actuaries pursue is to keep employer contribution rates stable. If, as suggested above, the normal cost for a given year were to be based on the cost of the benefits accrued during that year, the normal cost would likely rise from year to year due to inflationary and merit-based increases in salary. Employees earn higher benefits at higher salaries. Thus, the cost of benefits accrued during a single year at an early point in an employee's career would be less than the cost of benefits accrued during a single year at a later point in the employee's career.

In order to make the normal cost more stable, the majority (approximately 75 percent[3]) of large public pension systems in the U.S. use some type of "entry age" cost method, which spreads the costs more evenly across the years. Under this method, actuaries first calculate the present value of the benefit that the employee is likely to receive at retirement. Actuaries then determine the normal cost by assigning an equal portion of the present value of benefits to each year of service during the employee's career in a

constant dollar amount or as a constant percentage of the participant's estimated salary from year to year.

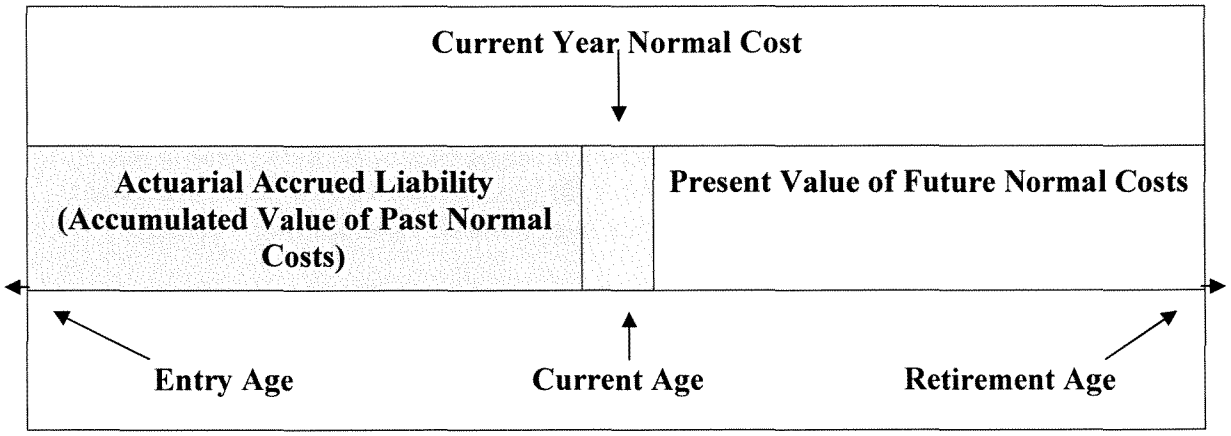
The Actuarial Accrued Liability (AAL)

The actuarial accrued liability is the value today of all past normal costs. Retired employees are no longer accruing additional benefits, so their AAL is the entire value of their benefit – i.e., for retires all normal costs are in the past. For active members, the AAL can be thought of as the amount of assets the system would have today if:

- The current plan provisions, participant data and actuarial assumptions had always been in effect;
- In each past year, contributions equaled the normal cost for that year; and
- In each past year, all the actuarial assumptions had come true.

Figure 1 illustrates how the actuarial accrued liability and the normal cost relate to the present value of future benefits. Recall that the PVB is the total cost of benefits accrued throughout an employee's career. The normal cost is portion of that total cost that must be paid during the current year. The AAL represents the accumulation of past normal costs for each year that the employee has worked.

Figure 1. Present Value of Future Benefits (PVB) (for an active employee)



Asset Smoothing Method

Actuaries assign a market-related value to a plan's assets in order to determine contribution requirements. This value is called the actuarial value of assets (AVA) or, more commonly, the *smoothed value*. To minimize short term, year-to-year contribution rate fluctuations, actuarial policies typically require the plan's investment gains and losses to be spread, or smoothed, over a period of time. The objectives of the AVA are to:

- Track the market value of assets over time; and
- Produce a less volatile pattern of contributions than would result from using the market value.

For example, suppose a plan with a five-year smoothing period experiences a 10 percent gain (an increase over the expected return) in the market value of its assets in a given year. The plan will spread that gain over a period of five years, recognizing only a 2 percent increase in the current year's AVA for that particular gain. The remaining 8 percent of the gain will be included in the AVA over the next four years.

Amortization Policy

When actuarial assumptions are not met, the plan may fall behind in – or get ahead of – its funding schedule. Plan assets may become insufficient to cover liabilities, requiring employers to contribute an additional amount to pay for the shortfall.

The unfunded actuarial accrued liability is the amount (if any) by which the actuarial accrued liability exceeds the actuarial value of assets, while the surplus is the amount (if any) by which the AVA exceeds the AAL.

- When a plan has a shortfall of assets compared to liabilities (a UAAL), the current contribution includes the normal cost *plus* a charge to fund, or "amortize," the shortfall.
- When a plan has an excess of asset over liabilities (a surplus), the current contribution includes the normal cost *minus* a credit to amortize the excess.

A plan's amortization policy determines how to either fund or take credit for any difference between liabilities and assets (the UAAL or surplus). *Amortize* generally means to pay off an obligation through a series of payments. A plan's amortization policy determines how much of the UAAL will be funded each year, or how much of the surplus will be used up. Amortization policies

vary in terms of length and also in terms of whether there is one amortization period for the entire UAAL or separate amortization periods for different parts of the UAAL.

When a plan has unfunded liability, a shorter amortization period is generally considered to be a more conservative approach. Contributions will be higher than they would be with a longer amortization period, but the shortfall will be retired and contributions will revert down to the normal cost more quickly.

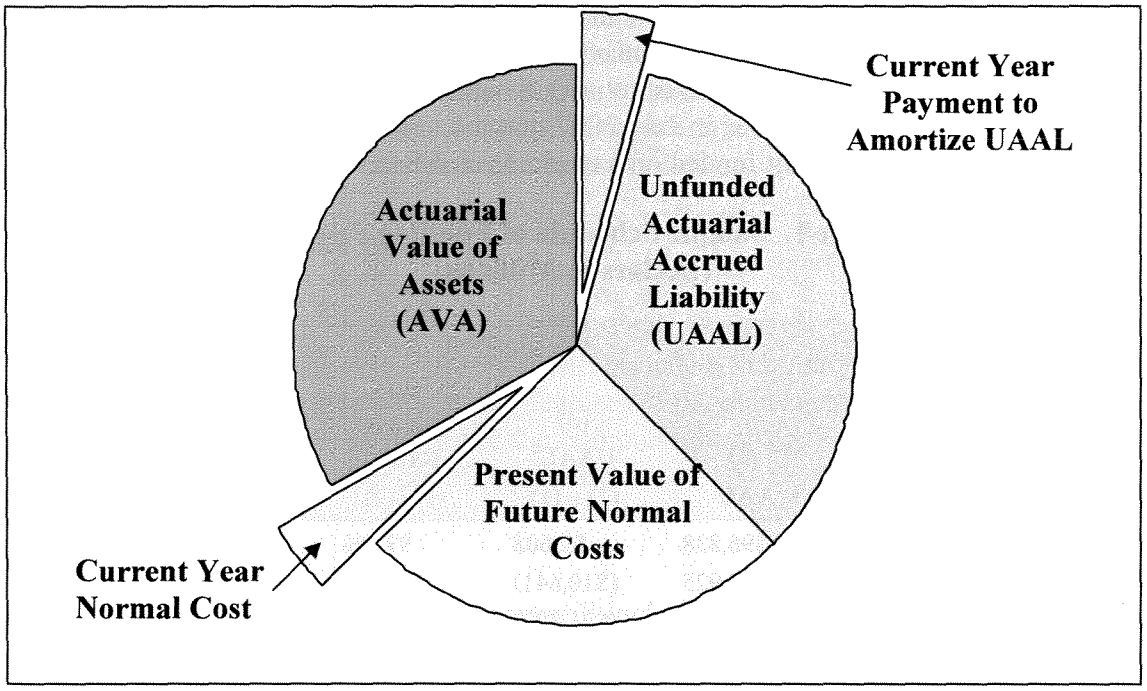
In contrast, when a plan has a surplus, a longer amortization period is more conservative. As CalPERS' Chief Actuary, Ron Seeling, notes, when a plan has a surplus, a shorter amortization period is no longer conservative:

> *Our prior funding methods at CalPERS had what anybody would call very conservative mathematical and actuarial practices. We amortized investment gains and losses over about ten years...We spread asset gains and losses over three years...And in a situation where you have an unfunded liability, that's going to really hurry up and get you back to 100 percent quickly, which is where we started.*
>
> *Now, witness the incredible stock-market boom of the late 1990s. And everything that was an unfunded liability turned into plus, and now you're giving surplus back to the employers through reduced contributions over three-year periods, and it resulted in 75 percent of all CalPERS employers contributing zero. So what was really conservative approaches, "let's hurry up and pay off unfunded liabilities," completely backfires.*[4]

The Required Contribution

Based on the asset smoothing and amortization policies of a plan, actuaries determine the current year normal cost and the portion of the cost of unfunded liabilities that need to be paid each year. These two elements constitute the current year contribution, the annual required contribution (ARC), and are represented by the two slices that extend out from the chart shown in Figure 2.

Figure 2. The Two Parts of the Current Year Contribution



In the pie chart presented in Figure 2, the AVA and the UAAL, combined, represent the value of the actuarial accrued liability. The portion of the AAL that is funded by current assets is the actuarial value of assets. The difference between the AAL and the AVA is the unfunded actuarial accrued liability. The yellow portion of the chart represents the costs that will have to be paid for future service for current members.

How to Read a Plan's Schedule of Funding Progress

One of the elements of an actuarial valuation is a schedule of funding progress. This can be thought of as an actuarial balance sheet that displays the value of the plan's assets and liabilities over time. It also shows a plan's funding progress as the ratio of assets to accrued liabilities expressed as a percentage (funded ratio). When assets exceed liabilities, the ratio is greater than 100 percent. When assets are less than accrued liabilities, the ratio is less than 100 percent.

The sample schedule of funding progress in Table 1 presents key actuarial figures for CalPERS valuations conducted for ten separate years. The valuations for the years 1997 through 2002 reflect significant investment earnings that resulted in a surplus (i.e., a negative value for UAAL) and funded ratios greater than 100 percent.

CalPERS data was used for this sample schedule of funding progress for no other reason than that it was readily available. The reader should note that the system's Public Employees' Retirement Fund has experienced double digit investment returns (well above assumed rates of return) annually since 2004. CalPERS officials announced in July 2007 that the majority of their plans were 100 percent funded on a market-value basis.[5]

Table 1. Sample Schedule of Funding Progress (Dollars in Millions)

Actuarial Valuation Date	(1) Actuarial Value of Assets	(2) AAL[1]	(3) UAAL[2] (2) – (1)	(4) Funded Ratios (1) / (2)	(5) Annual Covered Payroll	(6) UAAL as a % of Covered Payroll (3)/(5)
6/30/1996	$94,230	$96,838	$2,608	97.3%	$22,322	11.7%
6/30/1997	$108,566	$97,925	($10,641)	110.9%	$22,504	(47.3%)
6/30/1998	$128,830	$106,938	($21,892)	120.5%	$24,672	(88.7%)
6/30/1999	$148,605	$115,748	($32,857)	128.4%	$27,636	(118.9%)
6/30/2000	$162,439	$135,970	($26,469)	119.5%	$28,098	(94.2%)
6/30/2001	$166,860	$149,155	($17,705)	111.9%	$30,802	(57.5%)
6/30/2002	$156,067	$163,961	$7,894	95.2%	$32,873	24.0%
6/30/2003	$158,596	$180,922	$22,326	87.7%	$34,784	64.2%
6/30/2004	$169,899	$194,609	$24,710	87.3%	$35,078	70.4%
6/30/2005	$183,680	$210,301	$26,621	87.3%	$36,045	73.9%

1. Actuarial Accrued Liability.
2. Unfunded Actuarial Accrued Liability. Negative amount indicates an excess of assets over liabilities.

III. Actuarial Assumptions and Other Elements of a Valuation

Contribution requirements and funding progress are the end results of a valuation. Those results are dependent on a number of elements that go into the valuation. These include crucial information about the plan and its members, actuarial assumptions, and actuarial methods and policies.

Information about the plan

Plan provisions

The actuarial report will include a Summary of Benefit Provisions. It summarizes key features of the plan such as eligibility rules, benefit formulas, the computation of final compensation and member contribution rates.

Member data

The actuarial report will include various summaries of member data. There are three categories of members: actives, retirees (including beneficiaries), and inactive members who have terminated with a deferred vested benefit (members who are no longer working for employers covered by the plan, no longer making contributions, but who have not yet taken a refund of their contributions or begun to receive a retirement allowance). The membership data is reviewed by an actuary for reasonableness, but the actuary does not audit the data by comparing it to other data sources (payroll, etc.). This means the data will not be perfect, but that any data flaws are expected to result in only minor valuation result differences.

Financial data

The actuarial report will include summaries of plan assets and related calculations. This is usually obtained from the retirement system or from an outside auditor. From the market value information the actuary determines the actuarial (or smoothed) value that is used in the valuation. The valuation report will show how the actuarial value of assets is determined.

Demographic assumptions

Demographic assumptions determine when and for how long members will receive the various types of benefits. The main demographic assumptions are rates (probabilities) of *decrement*, (i.e., what percentage of members at each age will die, retire, become disabled, or withdraw/terminate).

Mortality assumptions

Mortality assumptions can vary by type of member and sometimes by cause of death. In particular, there can be different mortality assumptions for:

- Death before and after retirement;
- Service connected death and non-service connected death; and
- Service retirees, disabled retirees, and beneficiaries.

Retirement assumptions

Retirement assumptions are generally based on age, but can also depend on years of service. Often, there will be higher retirement rates assumed for members eligible for an unreduced retirement benefit, based either on service or on some combination of age and service.

Disability assumptions

Disability assumptions can vary by type of disability such as: whether the disability is job-related; whether the disability is total and permanent; and whether the benefit provides coverage for employees who can no longer perform the duties of their own occupation, or only for those who can no longer work at any occupation.

Withdrawal/termination assumptions

Actuaries make assumptions about members who withdraw from the system by withdrawing their member contributions and those who terminate after becoming vested, leave their contributions with the system and thereby have a deferred vested benefit. Termination rates can depend on age, on length of service, or on a combination of both.

Other demographic assumptions

Actuaries also make assumptions about other demographic factors that impact anticipated benefits including:

- Percent of active members married or with domestic partners (and thus eligible for survivor benefits);
- Member/spouse age difference for active members; and
- Percent of deferred vested members who are working in a reciprocal system (reciprocity is an agreement between or

among retirement system that provides portability of retirement benefits by allowing an employee to accrue benefits in all systems covered by the agreement).

Economic assumptions

Economic actuarial assumptions predict how the assets and benefits grow over time. The key economic assumptions are investment earnings, salary increases, and inflation. Because the three are related – inflation, for example, affects both investment earnings and salary increases – the assumptions should be kept consistent with one another.

Investment earnings assumptions

Investment earnings affect how much of future benefit payments can be funded by investment income rather than by contributions. The investment return assumption is composed of several components including inflation, the real rate of investment return, administrative expenses, and investment expenses.

What happens if the investment return assumption is lowered? Recall that the basic funding equation for employee benefit trusts says that contributions plus investment earnings must equal benefits and expenses over time. If lower investment earnings are anticipated, current contributions must increase to make up the expected difference.

Put another way, when trustees lower the investment return assumption they are saying that the current assets on hand are not expected to earn as much as previously thought and, thus, will not fund as large a portion of plan liabilities (i.e., the portion of the present value of benefits attributed to the past).

For the 126 retirement systems included in the 2006 National Association of Retirement System Administrator's Public Fund Survey, investment return assumptions ranged from 6 percent to 8.5 percent with a mean of about 8 percent.[6] CalSTRS uses an 8 percent investment return assumption; CalPERS uses 7.75 percent; while the retirement systems for Los Angeles and Alameda Counties use 7.75 percent and 7.8 percent, respectively.

Salary increase assumptions

The salary increase is typically composed of three components including inflation, real salary increases, and increases based on merit and promotion. A plan that raises its salary increase assumption expects to pay higher benefits. This is because

pensions are calculated based on employees' salaries. A higher rate of salary increase means that benefits will be higher and more money will be needed to pay for those benefits. This will increase contributions and liabilities.

In an actuarial valuation, a projection of *total payroll* usually includes inflation and real salary increases, but not the merit and promotion increases. These are increases that individual members receive as they advance in their careers. Because assumptions about merit and promotion increases are based on the specific experience of the system, this assumption is often studied along with the demographic assumptions.

Inflation assumptions

Inflation affects Cost of Living Adjustments (COLAs) and is also a component of both investment earnings and salary increases. Lowering the inflation assumption decreases the investment return, which causes contributions to go up and the funded ratio to go down. At the same time, however, a decrease in the inflation assumption causes a corresponding decrease in the salary increase rate. This causes the contribution rate to decrease and the funded ratio to increase.

In a typical plan, investment earnings have a significantly greater impact than salary increases. This means that, on the whole and assuming no other assumption components are changed, a decrease in the inflation assumption causes contribution rates to increase, because contributions rise more due to a lower investment return rate than they fall due to a lower salary increase rate.

IV. CURRENT ISSUES

Actuarial methods never lie, but...

In 2001, an article in the *Public Retirement Journal* reported that the CalPERS Board of Administration adopted a policy intended to "persuade local agencies to grant higher benefits to their employees in exchange for the actuarial manipulation of the value of their assets on deposit with PERS."[7] The background to this is that pension fund investment returns had risen considerably during the bull market of the 1990s, but due to the asset smoothing policy in place at the time, public agencies were recognizing less than market value in their actuarial value of assets. The Board policy increased the value in order to lessen the cost of adopting enhanced benefits.

Similarly, in 1996 trustees of the San Diego City Employees' Retirement System reduced the city's contribution rates contingent on the city granting benefit improvements.[8] By 2005, the city's pension debt rose significantly, its credit rating faltered, and there was speculation that the city might have to file for bankruptcy.

Cases such as these where trustees alter actuarial policies to reduce costs in the short term, and to make benefit increases appear less costly, diminish the public trust in retirement system boards and the actuarial profession.

Actuarial policies such as smoothing certainly serve a legitimate purpose. Smoothing helps to lessen the volatility of contribution rates. This makes it easier for employers to budget. Smoothing also buffers employers from the effects of market losses and ensures that they do not take credit for market gains too quickly. Problems arise, however, when established actuarial policies are altered for short-term contribution relief, or in exchange for a benefit improvement.

With rare exceptions, however, even these types of activities are certified by boards' actuaries. Actuarial certification indicates that they fall within the range of accepted practices as defined by the American Academy of Actuaries. The problem is that for any given situation there may be a range of accepted actuarial practices that is wide enough to allow retirement system boards to adopt policies that are aimed more toward achieving the short term objective of reducing costs than toward the long term objective of ensuring that the fund is managed according to sound actuarial principles.

A 2006 report published by a task force of the American Academy of Actuaries acknowledges that there is a difference between "accepted practices" and "best practices."[9] The report explains, however, that it is difficult to develop best practice standards because doing so may unnecessarily limit alternative practices that may in some instances be the most appropriate.

To address this issue, some states have increased legislative oversight of public retirement systems' actuarial methods and assumptions. Some have even passed legislation to enforce actuarial standards.

Since its enactment in 1983, the State of Georgia's Public Retirement System Standards Law has required that the actuarial cost of all pension legislation with a fiscal effect must be determined by an actuarial study arranged by the state auditor before the bill can leave its committee. The only amendments that can be made are those that would reduce the cost of the legislation. If no appropriations are made to fund the pension benefit changes, the bill is automatically repealed. The Employees Retirement System and Teachers' Retirement System of Georgia are among the best-funded public pension plans in the nation, with costs and benefits near the national median.[10] In 2006, the State of Oklahoma passed legislation modeled after the Georgia law.

Given the Constitutional authority granted to public retirement system boards in California under Proposition 162, which passed in 1992, it is unlikely that any legislation could diminish boards' authority to determine actuarial policies. The California Public Employee Post-Employment Benefits Commission, however, recommended the establishment of an actuarial advisory panel at the state level. The purpose of the panel would be to "provide the California Legislature, the Governor's Office, public retirement systems, public agencies, and other interested parties with impartial and independent information on pensions, OPEB benefits, and best practices."[11]

In January 2008, SB 1123 (Wiggins) was introduced in response to the Commission's recommendations. As introduced, the bill would create the California Actuarial Advisory Panel. The bill contains a number of additional provisions that would increase the transparency of actuarial practices for pension and retiree health benefits.

Have you heard the one about the two actuaries?

There is a joke about two actuaries on a golf course. One hits a tee shot that lands twenty feet to the right of the hole; the other, 20 feet to the left. The two celebrate with congratulatory high-fives after concluding that, on average, they accomplished a hole-in-one.

The joke serves to illuminate the reality that for any given year the contribution rates determined by an actuary will be too high or too low. It is impossible to predict the future with complete accuracy. Actuaries, however, are engaged in long-term planning, making projections 30 or more years out into the future. What matters is that the contribution rates they recommend are reasonable in the long-term and that the actuarial methods adopted are designed to meet the objective of paying for retirement benefits during the working career of the employee and not manipulated for the purpose of providing short-term contribution rate relief or to ease the burden of paying for benefit increases.

Actuarial work for pension (and for retiree health and other post-employment benefits) trusts can be compared to steering a ship across a sea. You set a course based on your knowledge of present conditions. As winds and currents shift, it may become necessary to change course to arrive at the desired port. Without accurate data about current conditions, periodic review, and a sound plan for how to act on the data, errors can compound over time and put the ship far off course.

This analogy has several implications for actuarial work intended to guide pension and OPEB trusts toward the destination of full funding. Due to the interrelationship of actuarial factors (inflation, for example, affects both investment returns and salary increases), errors can compound and significantly affect the outcome of actuarial forecasts. Actuarial assumptions must therefore be realistic and based on accurate data about member demographics and economic conditions. Actuarial studies should be repeated at regular intervals to determine whether assumptions need to be changed.

Finally, staying on course requires that boards who govern pension and OPEB trusts adhere to funding policies that are based on sound actuarial methods while resisting temptations to alter amortization periods, actuarial assumptions, or asset valuation methods for the purpose of lowering costs in the short-term if those changes would work to the detriment of the long-term funding plan and the goal of avoiding intergenerational transfers of benefit costs.

NOTES

[1] "Eight Year History of Premiums: 2000-2007," CalPERS Health Benefits Branch, California Public Employees' Retirement System.

[2] Testimony of Ron Seeling, Chief Actuary, California Public Employees' Retirement System, California Public Employee Post-Employment Benefits Commission Meeting, Burlingame, CA, July 12, 2007, pp. 125-6. http://www.pebc.ca.gov/images/files/Minutes-071207.pdf.

[3] 2006 Public Fund Survey, National Association of State Retirement Administrators, http://www.publicfundsurvey.org.

[4] Testimony of Ron Seeling, Chief Actuary, California Public Employees' Retirement System, California Public Employee Post-Employment Benefits Commission Meeting, Burlingame, CA, July 12, 2007, pp. 132-3. http://www.pebc.ca.gov/images/files/Minutes-071207.pdf.

[5] Testimony of Ron Seeling, Chief Actuary, California Public Employees' Retirement System, California Public Employee Pos-Employment Benefits Commission Meeting, Burlingame, CA, July 12, 2007, p. 139. http://www.pebc.ca.gov/images/files/Minutes-071207.pdf.

[6] "2006 Public Fund Survey," National Association of State Retirement System Administrators, 2007. http://www.publicfundsurvey.org.

[7] "So, Why Do We Have Staff?," *The Public Retirement Journal*, May/June 2001, p. 1.

[8] "San Diego's Pension Scandal for Dummies," by Daniel Strumpf, *San Diego City Beat*, June 22, 2005.

[9] "A Critical Review of the U.S. Actuarial Profession: Final Report for the U.S. Actuarial Profession and Other Interested Parties," prepared by the American Academy of Actuaries' Critical Review of the U.S. Actuarial Profession Task Force," December 2006.

[10] "NASRA Response to Reason Foundation Study, 'The Gathering Pension Storm," National Association of State Retirement Administrators, p. 6. http://www.nasra.org/resources/NASRA%20Reason%20Response.pdf.

[11] "Funding Pensions and Retiree Health Care for Public Employees," California Public Employee Post-Employment Benefits Commission, January 2008, p. 190. http://www.pebc.ca.gov/images/files/final/080107_PEBCReport2007.pdf.